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U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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Forest Insect and Disease Conditions Intermountain Region 1979

COVER STORY

Dwarf mistletoe in overstory trees serves as a source for infecting regeneration. Removal of the infected overstory is necessary for control of dwarf mistletoe.

FOREST INSECT AND DISEASE CONDITIONS

INTERMOUNTAIN REGION

1979

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RESUMÉ OF CONDITIONS

Bark beetles were once again the major cause of tree mortality in the Intermountain Region with an estimated loss of 5,505,000 trees. The majority of the mortality (5,209,000 lodgepole pine) was caused by the mountain pine beetle on the Targhee National Forest in Idaho and Wyoming.

Douglas-fir mortality remained static in the Intermountain Region with an estimated 15,600 trees killed. An increase was noted in Grand Teton National Park in Wyoming and decreases were noted on the Boise and Salmon National Forests in Idaho.

Western pine beetle caused a minimal amount of mortality on the Boise and Payette National Forests in 1979 and pine engraver beetle activity declined on the Boise National Forest. A fir bark beetle was noted on the Payette National Forest in subalpine fir and grand fir; roundheaded pine beetle was observed on the Dixie National Forest, Utah, in ponderosa pine. Western balsam bark beetle and a root rot were associated with subalpine fir mortality on the Sawtooth National Forest, Idaho.

Defoliation by western spruce budworm expanded by 244,000 acres in 1979 to 1,272,700 acres exclusive of the Idaho Primitive Area. Expansions occurred on the Salmon, Targhee, and Boise National Forests, in Idaho, and Grand Teton National Park. Decreases were noted on the Bridger-Teton National Forest in Wyoming and Payette National Forest in Idaho.

Results of a dwarf mistletoe survey quantified the incidence of and growth reduction caused by the pathogen in fifteen of the sixteen National Forests in the Intermountain Region. Winter injury was prominent, mainly on seedlings and saplings, in both individual trees and forest stands on the Payette, Boise, and Sawtooth National Forests.

ENTOMOLOGY

Bark Beetles

Mountain pine beetle, *Dendroctonus ponderosae* Hopkins Lodgepole Pine

Mountain pine beetle activity increased dramatically on the Targhee National Forest but decreased in other areas of the Region (Figure 1). Total tree mortality from mountain pine beetle was estimated at 5,435,000.

Figure 1. Extensive lodgepole pine mortality caused by the mountain pine beetle, Targhee National Forest, Idaho.

The Targhee National Forest, which has a history of massive mountain pine beetle outbreaks, once again experienced heavy buildups along the western slopes of the Teton mountain range

from the southern boundary of Yellowstone Park southward to the Victor-Jackson Hole Highway. This area was beset with heavy lodgepole mortality from mountain pine beetle fifteen years ago. There was also a considerable upsurge of mountain pine beetle activity in the forest fringe type west of Driggs, Idaho, in the Teton Basin Ranger District. Estimated lodgepole pine mortality for the entire Targhee National Forest in 1979 was 5,209,000 trees.

On the Payette National Forest in Idaho, lodgepole pine mortality attributed to the mountain pine beetle continued in the Johnson Creek-Hornet Reservoir area. Lodgepole and ponderosa pine in and around McCall, Idaho, and southward along the North Fork of the Payette River to Smiths Ferry, Idaho, suffered heavy mortality. On the Boise National Forest, tree killing by the mountain pine beetle occurred north and east of Deadwood Reservoir. Also, considerable mortality was sketch-mapped along the Deadwood River northward toward Deadwood Summit. Another large infestation center which expanded during the 1979 season borders the primitive area along the North Fork of the Boise River in the vicinity of Graham airstrip. An estimated 11,000 lodgepole pine were killed in an infestation in Clear Creek, southeast of Cascade, Idaho, on Federal, State and private lands.

Massive infestations of mountain pine beetle on the Twin Falls District, Sawtooth National Forest, showed a marked decrease in activity. The rapid decline in this area started in 1977 and has dropped off to where less than 2,000 trees are currently infested. The mountain pine beetle continued to cause large-scale lodgepole pine mortality in Warm Springs Creek and its tributaries west of Ketchum, Idaho. Also, widespread mortality was observed north of Ketchum along the Wood River to Galena Summit. Elsewhere, the mountain pine beetle has killed thousands of lodgepole pine along the upper reaches of the South Fork of the Boise River.

On the Caribou National Forest in Idaho and Ashley National Forest in Utah, tree killing was static in some areas and increasing in others. On the Ashley National Forest, around Greendale Junction, infestations in ponderosa and lodgepole pine continued at a high level. Mountain pine beetle infestations were also sketch-mapped in Alma-Taylor Hollow, Big Lake, Gull Lake, Greendale Junction, and near Browne Lake. These infestations have been chronic on the Ashley National Forest for several years. During the early and mid-fifties, epidemic populations of mountain pine beetle devastated large areas of lodgepole pine in this same area. Caribou National Forest infestations were centered north and south of Rasmussen Ridge and south of Upper Valley to Freeman Pass and in several areas west of Green Basin.

Mountain Pine Beetle - Ponderosa Pine

Ponderosa pine killed by the mountain pine beetle showed up in localized areas on the Boise and Payette National Forests. A relatively new infestation of mountain pine beetle occurred in the ponderosa pine belt on the Escalante Ranger District, Dixie National Forest; an estimated 45,000 trees have been killed to date. Populations in this area are considered epidemic and increasing with as high as 49 dead trees per acre in the Cowpuncher area.

Douglas-fir Beetle, *Dendroctonus pseudotsugae* Hopkins

Overall, Douglas-fir beetle activity has shown a steady decline since 1977. In the Intermountain Region, total tree mortality associated with Douglas-fir beetle was estimated at 15,600 in 1979. An exception to the decline occurred on the Boise

National Forest along the South Fork of the Payette River and the Middle Fork of the Boise River (Figure 2). The large number of infestation centers previously recorded on the Salmon National Forest dropped off dramatically except in areas from Dump Creek on the Salmon River westward to the mouth of Panther Creek. Heavy group infestations at the mouth of Deer Creek and eastward along Panther Creek drainage toward Napias Creek decreased in numbers of groups and trees per group. Chronic large-scale group outbreaks in Iron Creek on the Salmon National Forest virtually disappeared.

Figure 2. Douglas-fir killed by the Douglas-fir beetle, Boise National Forest, Idaho.

In 1978 an upsurge of Douglas-fir beetle activity was noted on the east-facing slopes of the Grand Teton National Park from Phillips Canyon northward to Moran Bay. Group sizes in 1979 increased considerably with large-scale tree killing evident in the Douglas-fir stands.

Western Pine Beetle, *Dendroctonus brevicomis* **LeConte**

Western pine beetle-killed ponderosa pine was minimal in 1979 on both the Boise and Payette National Forests. Only twelve mortality centers were observed during aerial detection surveys with groups averaging less than eight trees each. Mortality was concentrated on the west side of both Forests in old-growth

overstocked stands previously infested with western pine beetle. A few trees were recorded killed by the western pine beetle on the Escalante Ranger District, Dixie National Forest, during ground evaluations. These were associated with a mountain pine beetle infestation currently in progress.

Pine Engraver Beetle, *Ips pini* **(Say)**

Pine engraver infestations in Boise National Forest ponderosa pine stands showed an overall decline from 1978 levels. Mortality centers dropped from 290 in 1978 to approximately 100 in 1979. On the east side of the Forest new outbreaks increased over last year's levels with a serious infestation affecting over 3,000 trees in the Fall Creek drainage near Anderson Ranch Reservoir. Scattered groups of fading ponderosa pine also appeared in the South Fork of the Boise River north of Anderson Ranch Reservoir.

On the Payette National Forest, *Ips* infestations continued to decline with only 200 fading trees observed from the air this year. The greatest concentration of fading trees was in the area west of Council along Hornet Ridge.

A Fir Bark Beetle, *Pseudohylesinus dispar* **Blackman**

This bark beetle was found killing pole and sawtimber grand fir and subalpine fir on the Payette National Forest. Single trees were killed as opposed to group killing by other bark beetles. Attacks along the bole were numerous with horizontal egg galleries approximately 6-8 cm in length.

Roundheaded Pine Beetle, *Dendroctonus adjunctus* **Blandford**

A survey of ponderosa pine on the Escalante Ranger District,

Dixie National Forest, Utah, showed the roundheaded pine beetle as one of the responsible agents causing mortality. Ponderosa from 4-30" dbh were killed either by the beetle solely or in association with mountain pine, western pine and engraver beetles. Mortality of ponderosa increased approximately six times the amount recorded in 1977 and 1978. Pole and small sawtimber were the more commonly affected size classes.

Western Balsam Bark Beetle, *Dryocoetes confusus* **Swaine**

Chronic mortality of subalpine fir continued to occur throughout the subalpine fir habitat types in the Intermountain Region. The western balsam bark beetle is associated with much of the mortality; however, root rots are also involved. Subalpine fir on the Ketchum Ranger District, Sawtooth National Forest, had *D. confusus* and a root rot associated with the mortality.

Defoliators

Western Spruce Budworm, *Choristoneura occidentalis* **Freeman**

Western spruce budworm activity in the Intermountain Region remained high in 1979. Aerial sketch-mapping surveys showed 1,272,700 acres defoliated, an increase of 154,100 acres over 1978 (Table 1). These figures exclude defoliation in the Idaho Primitive Area. Defoliation increases in 1979 occurred on the Salmon, Targhee, and Boise National Forests, and the Grand Teton National Park. Total acreage of defoliation decreased in 1979 on the Bridger-Teton National Forest and Payette National Forest.

Table 1. Areas of visible defoliation by western spruce budworm in the Intermountain Region during 1979 as determined by aerial surveys. (Primitive area defoliation not included.)

	DEFOLIATION INTENSITY (ACRES)			
Area	**Light**	**Moderate**	**Heavy**	**Total**
Boise	44,800	36,100	66,500	258,000[1]
Payette	46,400	52,900	176,200	303,900[2]
Targhee	38,900	79,000	88,800	206,700
Salmon	91,800	99,800	153,000	344,600
Bridger-Teton	38,300	73,900	34,800	147,000
Grand Teton	7,100	3,600	1,800	12,500
TOTALS	**267,300**	**345,300**	**521,100**	**1,272,700**

[1] Includes an additional 110,600 acres of the 1979 operational spray project not recorded by defoliation intensity.

[2] Includes an additional 28,400 acres of the 1979 operational spray project not recorded by defoliation intensity.

Two Idaho National Forests, the Challis and the Caribou, were not flown in 1979, although they did show evidence of budworm defoliation observed during overflights to other survey areas.

The Salmon National Forest showed the greatest increase in budworm activity. In 1978, 183,200 acres were defoliated and by 1979 this figure increased to 344,600 acres, an increase of 161,400 acres. This upsurge was especially heavy on the North Fork Ranger District.

On the Targhee National Forest defoliation increased from 105,800 acres in 1978 to 206,700 acres in 1979. This was due to intensification in old areas and new outbreaks in the North Fork of Indian Creek, in Blowout Canyon and in Game Creek.

On the Boise National Forest defoliation increased by 30,000 acres. Although a decrease occurred one mile north of Deadwood Reservoir, it was more than compensated for by new outbreaks and an increase of acreage in already infested areas. New outbreaks were located seven miles north of Deadwood Reservoir, along both sides of Canyon Creek, from Fox Creek northeast to within two miles of Bull Trout Lake, and a few small outbreaks near Monumental Peak and Eureka Point.

On the Grand Teton National Park there was an increase of 9,300 acres of light to moderate defoliation located on the west side of the Park around Phelps Lake extending to Jenny Lake and also along the west side of Jackson Lake. Heavy defoliation occurred on Blacktail Butte.

On the Payette National Forest a decrease in defoliation of 5,000 acres was recorded. There were a few new outbreaks, whereas some older areas decreased in size.

On the Bridger-Teton National Forest there was a decrease in activity and defoliation even though there were a few new outbreaks southwest and northeast of Phelps Lake. Overall the areas of defoliation have consolidated and decreased in intensity.

Table 2 depicts budworm activity for the past 16 years in the Intermountain Region.

Table 2. Areas of visible defoliation by the western spruce budworm in the Intermountain Region during the past 16 years as determined by aerial surveys.

Year	DEFOLIATION INTENSITY (ACRES)			
	Light	Moderate	Heavy	Total
1964	266,000	658,000	1,352,000	2,276,000
1965	465,600	254,500	795,200	1,515,300
1966	923,900	52,200	16,100	992,200
1967	162,200	54,900	1,600	218,700
1968	333,500	150,200	21,800	505,500
1969	388,800	125,400	30,200	544,400
1970	223,200	79,300	5,200	307,700
1971	229,300	110,300	34,300	373,900
1972	395,300	100,700	9,500	505,500
1973	99,700	76,400	48,000	224,100
1974	234,900	111,300	11,600	357,800
1975	568,800	130,900	33,700	733,400
1976	265,100	213,000	218,300	1,084,000[1]
1977	195,400	213,300	288,600	988,300[2]
1978	187,800	446,900	483,900	1,457,000[3]
1979	267,300	345,300	521,100	1,272,700[4]

[1] Includes an additional 387,600 acres in the Idaho Primitive Area not recorded by defoliation intensity.

[2] Includes an additional 291,000 acres in the Idaho Primitive Area not recorded by defoliation intensity.

[3] Includes an additional 338,400 acres in the Idaho Primitive Area not recorded by defoliation intensity.

[4] Includes an additional 139,000 acres of the 1979 operational spray project not recorded by defoliation intensity.

Larch Casebearer, *Coleophora laricella* **(Hübner)**

Defoliation by larch casebearer that was detected in the Elkhorn Creek drainage on the Payette National Forest in 1978 persisted in 1979. Another larch casebearer infestation of approximately 110 acres was detected in 1979 on the Boise National Forest in the Van Wyck Creek drainage on the west side of Cascade Reservoir.

Ponderosa Pine Needle Miner, *Coleotechnites* **sp.**

This needle miner was active on approximately 1,060 acres in Lick Creek and Powder Gulch drainages of the North Fork Ranger District, Salmon National Forest. Needle miner activity was also detected on 1,600 acres in Second Fork, Fir Gulch and Pine Creek drainages on the Emmett Ranger District, Boise National Forest.

PATHOLOGY

Dwarf Mistletoes, *Arceuthobium* spp.

A survey was conducted on the Challis National Forest in Idaho and Dixie National Forest in Utah to assess the incidence of and cubic-foot growth reduction due to lodgepole pine dwarf mistletoe (*Arceuthobium americanum* Nutt. ex Engelm.) and ponderosa pine dwarf mistletoes (*A. campylopodum* Engelm. and *A. vaginatum* subsp. *cryptopodum* (Engelm.) Hawks, and Weins). Douglas-fir stands were also surveyed for dwarf mistletoe (*A. douglasii* Engelm.) in anticipation of future analysis with proposed Douglas-fir yield simulation models. The survey consisted of both a roadside rating and detailed plot inspections.

One hundred and eighty-two miles of roadside were surveyed on the Challis National Forest and 246 miles were surveyed on the Dixie National Forest. Temporary fixed (11.8 ft.) and variable-radius (BAF 10) plots were established every two miles in the roadside survey to provide the growth reduction data. Incidence of dwarf mistletoe from the roadside surveys in 1978 and 1979 is summarized in Table 3.

Growth reduction estimates were made on lodgepole pine stands by running the plot data through the RMYLD yield simulation program. To make the Forest figures comparative, the annual cubic-foot reduction was divided by the acres of lodgepole pine type on each Forest (Table 4).

Table 3. Incidence of lodgepole pine, ponderosa pine, and Douglas-fir dwarf mistletoes on 15 National Forests in the Intermountain Region, 1978-1979.

National Forest	PERCENT OF SPECIES INFECTED		
	Lodgepole Pine	Ponderosa Pine	Douglas-fir
Ashley	58	8	21
Boise	57	*	78
Bridger-Teton	67	-	17
Caribou	68	-	21
Challis	70	-	40
Dixie	-	10	89
Fishlake	-	66	24
Manti-LaSal	-	34	*
Payette	50	*	80
Salmon	59	*	49
Sawtooth	71	*	53
Targhee	79	-	55
Toiyabe	17	35	25
Uinta	28	-	-
Wasatch	34	-	9

- Little or none of this species occurs on the Forest.

* Category needs further investigation.

Table 4. Incidence of dwarf mistletoe in lodgepole pine and estimated growth reduction for nine National Forests in the Intermountain Region.[1]

National Forest[2]	Number of Plots Established Within LPP Type	Percent of Lodgepole Pine Plots with Dwarf Mistletoe	Annual Cubic-Foot Volume Loss Due to Dwarf Mistletoe	Annual Cubic-Foot Volume Loss Per Acre of LPP Type
Ashley	31	58	3,304,455	7.6
Boise	17	57	1,598,052	6.7
Bridger-Teton	30	67	3,491,856	7.9
Caribou	19	68	2,290,318	7.3
Payette[3]	6	50	1,460,868	7.7
Salmon	34	59	4,965,080	11.1
Sawtooth[4]	7	71	3,798,757	21.6
Targhee	58	79	6,066,900	7.2
Wasatch	41	34	1,600,066	3.9

[1] Based on 1978 roadside survey information and computations from the RMYLD simulation model.

[2] Humboldt, Toiyabe, Fishlake, Dixie, Manti-LaSal, and Uinta National Forests have little or no lodgepole pine type. The Challis National Forest was not completed.

[3] Few plots were established because of relatively little lodgepole pine type.

[4] From Burley and Twin Falls Ranger Districts only.

Forest Insect and Disease Management funding was provided to three National Forests in 1979 for dwarf mistletoe control projects. About 12,000 acres of regenerated stands were protected from future dwarf mistletoe infections through sanitation and overstory removal projects. These include:

11,050 acres on the Targhee National Forest, Idaho
510 acres on the Payette National Forest, Idaho
400 acres on the Caribou National Forest, Idaho

An additional 10,000 acres of older clearcuts were presuppression surveyed on the Targhee National Forest to stratify areas for future dwarf mistletoe control projects.

Winter Injury

Winter burn was severe on individual seedling and sapling ponderosa on the Payette National Forest. Injured trees were generally open-grown or on the south sides of stands near roadcuts. Most of the trees recovered by the fall of 1979.

Winter drying also affected grand fir saplings in the mountain valleys near Cascade, Idaho, on the Boise National Forest (Figure 3). When excavated in early May, soil moisture was still frozen six inches below the surface.

Figure 3. Winter burn on grand fir sapling near Cascade, Idaho, Boise National Forest.

About 1,800 acres of Douglas-fir in and adjacent to the Baldy Mountain ski complex on the Sawtooth National Forest were affected by winter injury. Foliage mortality occurred both uniformly on the same sides of all trees in a stand or in a mottled pattern. The affected trees are expected to recover.

Both winter burn and drying resulted from abnormally cold temperatures with less than average insulating snowpack that occurred in the southern Idaho area in the winter of 1978.

Dutch Elm Disease, *Ceratocystis ulmi* (Buisman) C. Moreau

No confirmed cases of this disease were reported in Utah and Nevada. In southern Idaho the disease continued to take a toll of elms in communities without control programs. Losses in the city of Boise, Idaho, were held to six trees, mainly due to an aggressive Dutch Elm Disease control program.

Douglas-fir Mortality Survey

An estimated 10 percent of the Douglas-fir trees around the Featherville, Idaho, area have died in the past five years. This mortality was previously attributed to the Douglas-fir beetle. A cooperative survey project between the USDA Forest Service and the University of Idaho involved detailed dissections and measurements of sample trees. Samples of insects and cultures of decays and stains were taken for laboratory analysis.

Results of the survey suggest that four systems of organisms are operating in conjunction to kill the trees. A root rot infection initiates the host's decline in all cases. One system's sequence of attack begins with *Phaelous schweinitzii* (formerly *Polyporus*) which was found in over half of the sampled symptomatic trees. It is speculated that after the rot destroys about

80 percent of the host's root system, the tree is secondarily attacked and killed by insects, stain fungi, and other secondary root pathogens. A second system was thought to begin with *Polystictus tomentosus* (*Polyporus*) infection. From this initial infection the host's decline was the same as the *schweinitzii* system. The same sequence occurred again with *Perenniporia subacida* (Poria) as the primary mortality agent. Finally, a fourth system starts with *Verticicladiella* spp. invading the fine rootlets and terminates with the beetle *Pseudohylesinus nebulosus* girdling the tree.

Survey results indicate deterioration of the stand did not occur until the trees were 60 to 70 years old. To minimize subsequent mortality, Douglas-fir stands in the area should be managed on short rotation periods.

DISTRIBUTION OF MAJOR FOREST INSECT INFESTATIONS IN REGION 4*

1979

LEGEND

- *Mountain Pine Beetle*
- *Douglas-fir Beetle*
- *Western Spruce Budworm*

Based on aerial and ground surveys

STATE AND PRIVATE FORESTRY

FOREST SERVICE

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SCALE

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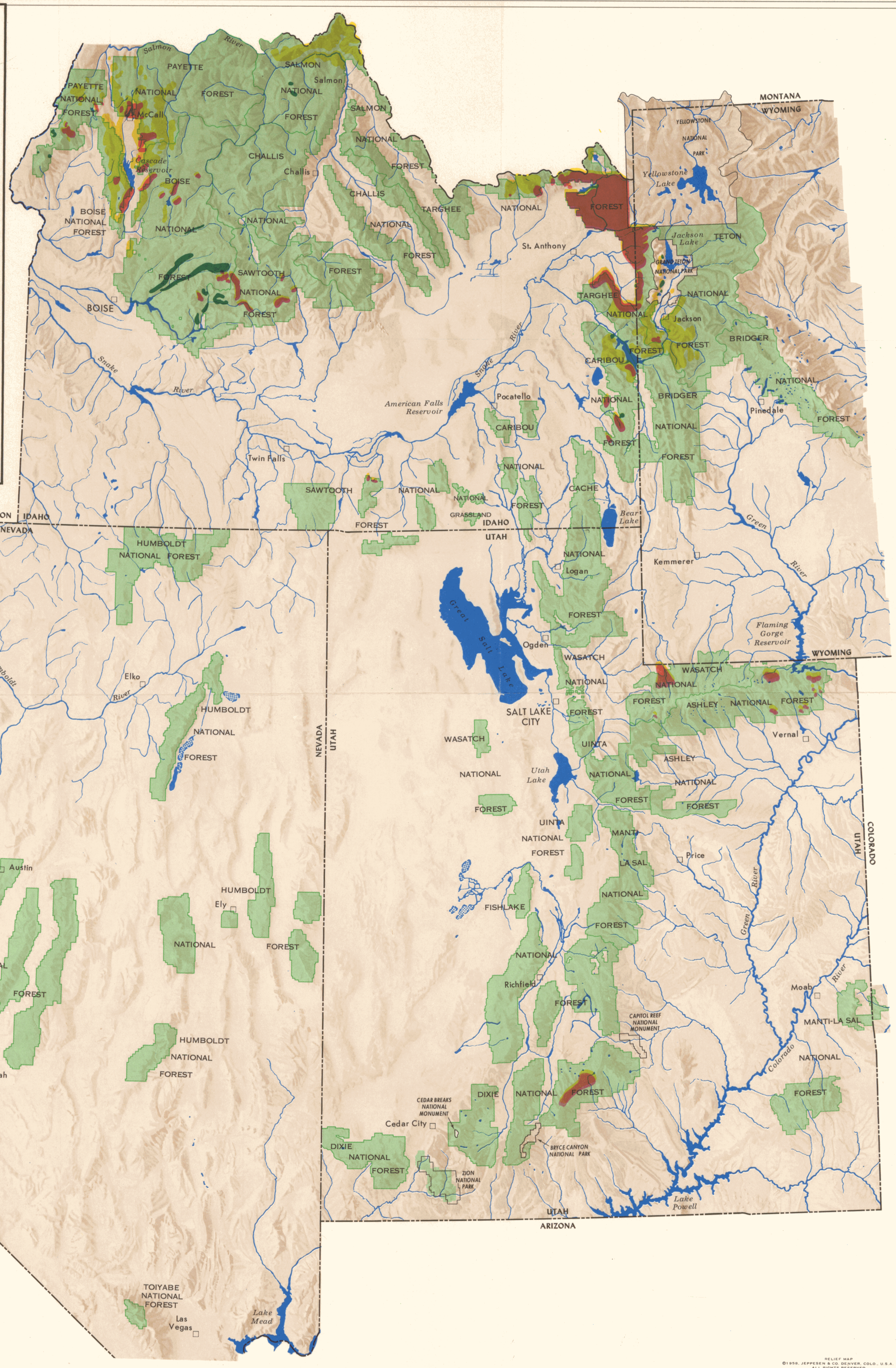
*Recent reorganization has resulted in numerous boundary changes which are not shown on this map. In addition portions or several National Forests were not flown.



RELIEF MAP
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